Course Introduction

Cabrillo College

CIS 81 and CST 311

Rick Graziani

Cabrillo College and CSUMB

Fall 2007

Introduce yourselves...

Introductions

Rick Graziani (me ☺)

- **Main Web Page:**
  - http://www.cabrillo.edu/~rgraziani

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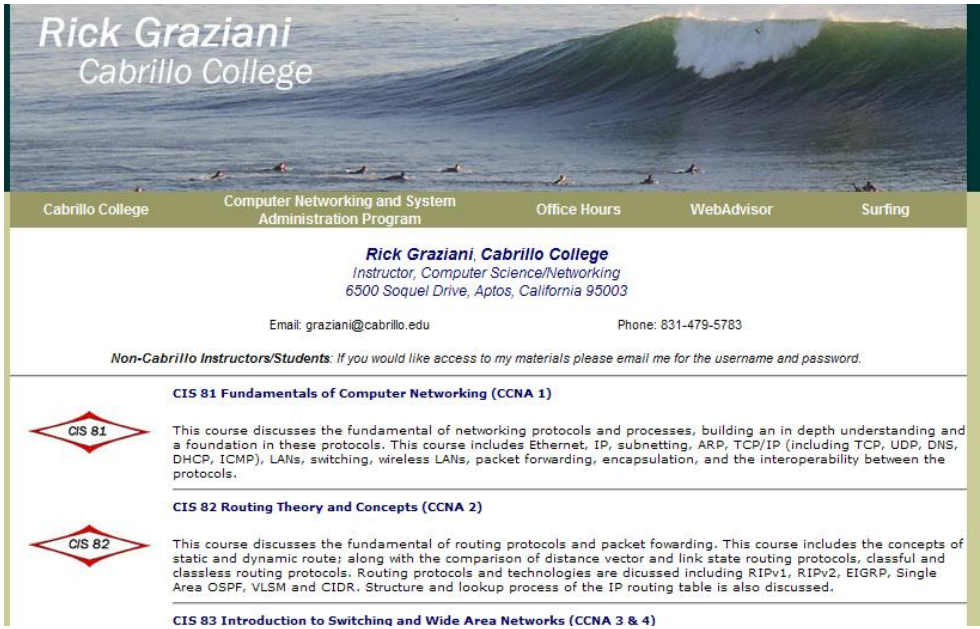


Course Information – “Official description”

CIS 81 – Network Fundamentals (The “official description”.)

- ***Concepts, Terminology, OSI Model, IP Addressing, Subnetting, Ethernet, LANs, Protocols, Packets, Frames, Data Communications***
- This is the first course in the Cisco Networking Academy CCNA curriculum, and is a prerequisite for some of the MCSE/MCSA and SAIR Linux certification courses.
- It introduces networking standards, concepts, topology, media and terminology including LANs, WANs, the OSI model, cabling, IP addressing, subnetting, network hardware and various protocols.
- This course also provides additional information on networking theory and protocols beyond that of the basic Cisco Networking Academy Semester 1 course, leading to a more detailed understanding of networking.

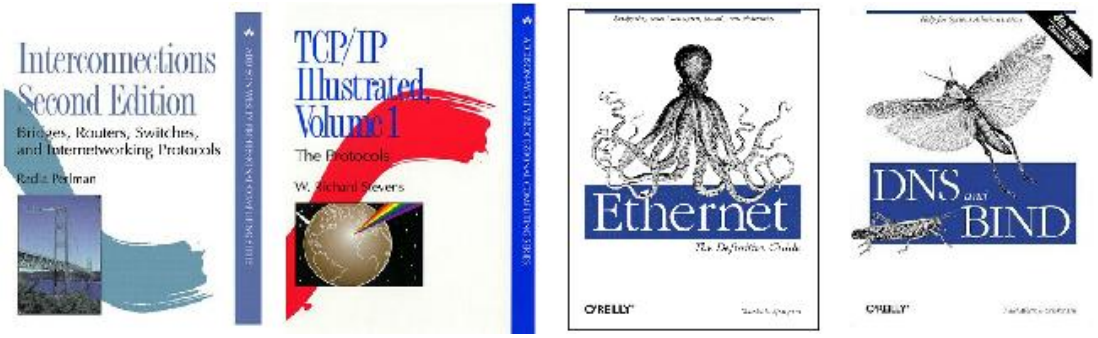
Course Information – “Official description”

- CST 311 ~ Intro Telecommunications

- Description: Survey of Telecommunication and Data communications technology fundamentals, Local Area Networks, Wide Area Networks, Internet and internetworking protocols including TCP/IP, network security and performance, emerging industry trends such as voice over the network and high speed networking. Designed as a foundation for students who wish to pursue more advanced telecommunications studies including certificate programs. Includes hands-on networking labs that incorporate Cisco CCNA module 1 as a lab component.

Course Information – My description

- Introduction to networking protocols.
- “Training is for a job, whereas education is for a career.”
- The focus of this class is ***education*** and to help the you develop a real ***understanding*** of networking, not merely memorizing facts and commands.
- We will focus on:
  - Protocols
  - Algorithms
  - Processes
- We include university level curriculum and textbooks from industry experts and authors such as Radia Perlman and W. Richard Stevens.

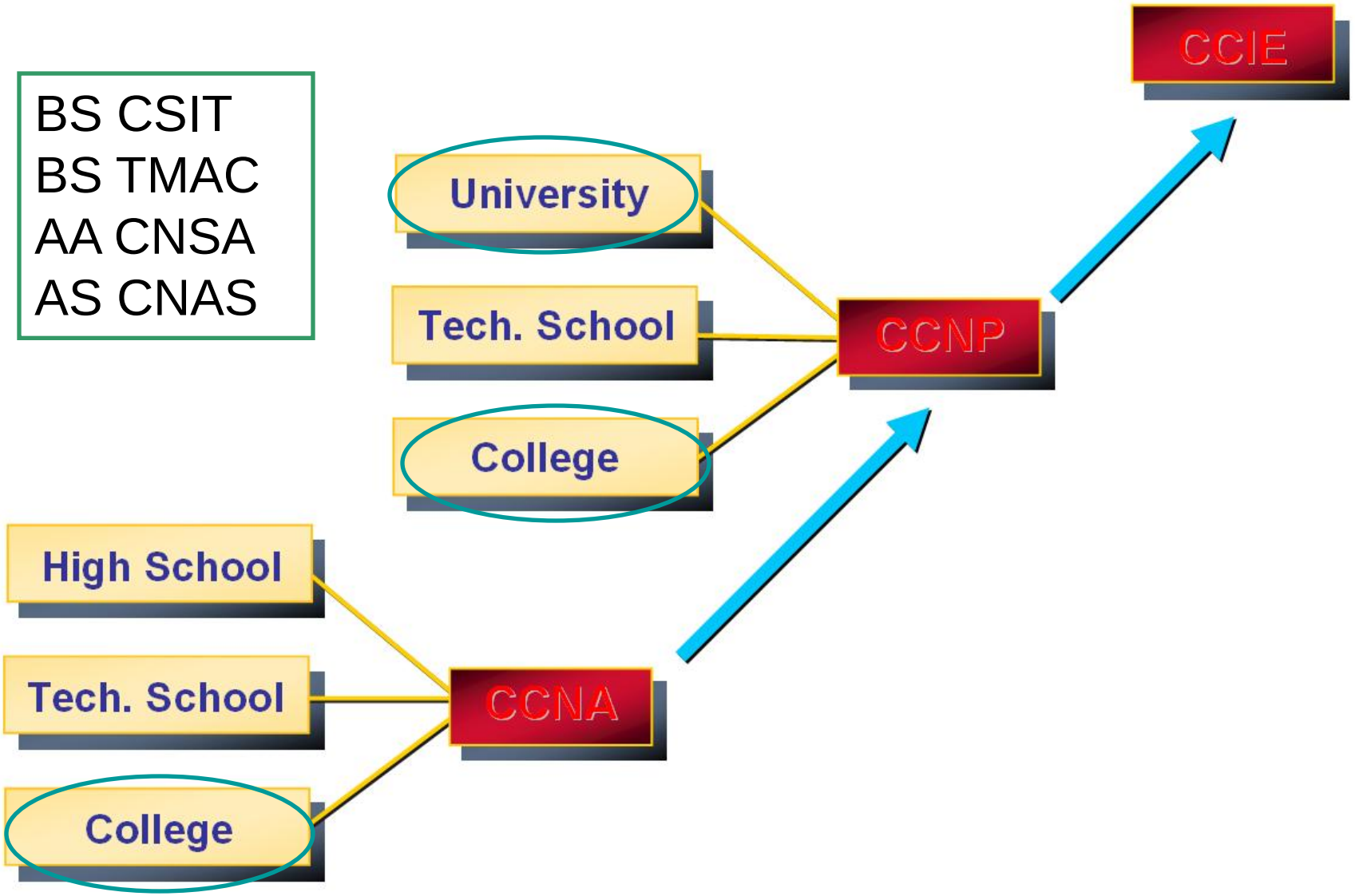


What about Certifications?

- I suggest that getting a four-year degree in networking should be a priority for “most” students.

- For those students interested in certifications, our goal is not only to help you obtain your CCNA, CCNP and other certifications, but to help you develop the knowledge and skills to live up to that certification title.
- We want to help develop networking professionals, CCNAs, CCNPs, etc., not just people who can pass the exams.

CCNA – CCNP – CCIE : AA – AS – BS



CCNA Curriculum

- Exploration: College/University Level
- Discovery: Introductory Level

What about Cisco Systems?

- **Question**: Does this and some of the other courses focus only on Cisco Systems networking? Does it apply to using non-Cisco equipment?

- **Answer**: All of the information in CIS 81 (CST 311) and more than 95% of the courses that use Cisco equipment applies to general networking knowledge.
  - Cisco, Nortel, Lucent, Alcatel, Foundry, Juniper, and others, all apply industry standards protocols from IETF, IEEE, and others.
  - Typing the commands on the equipment is very easy. Understanding what is happening; how to design, implement, and troubleshoot networks is the difficult part.

Watsonville Routing Table

Network	Exit Int.	Next Hop
172.16.0.0	S0	Connected
192.168.1.0	E0	Connected
Default	S0	172.16.10.2

ISP A Routing Table

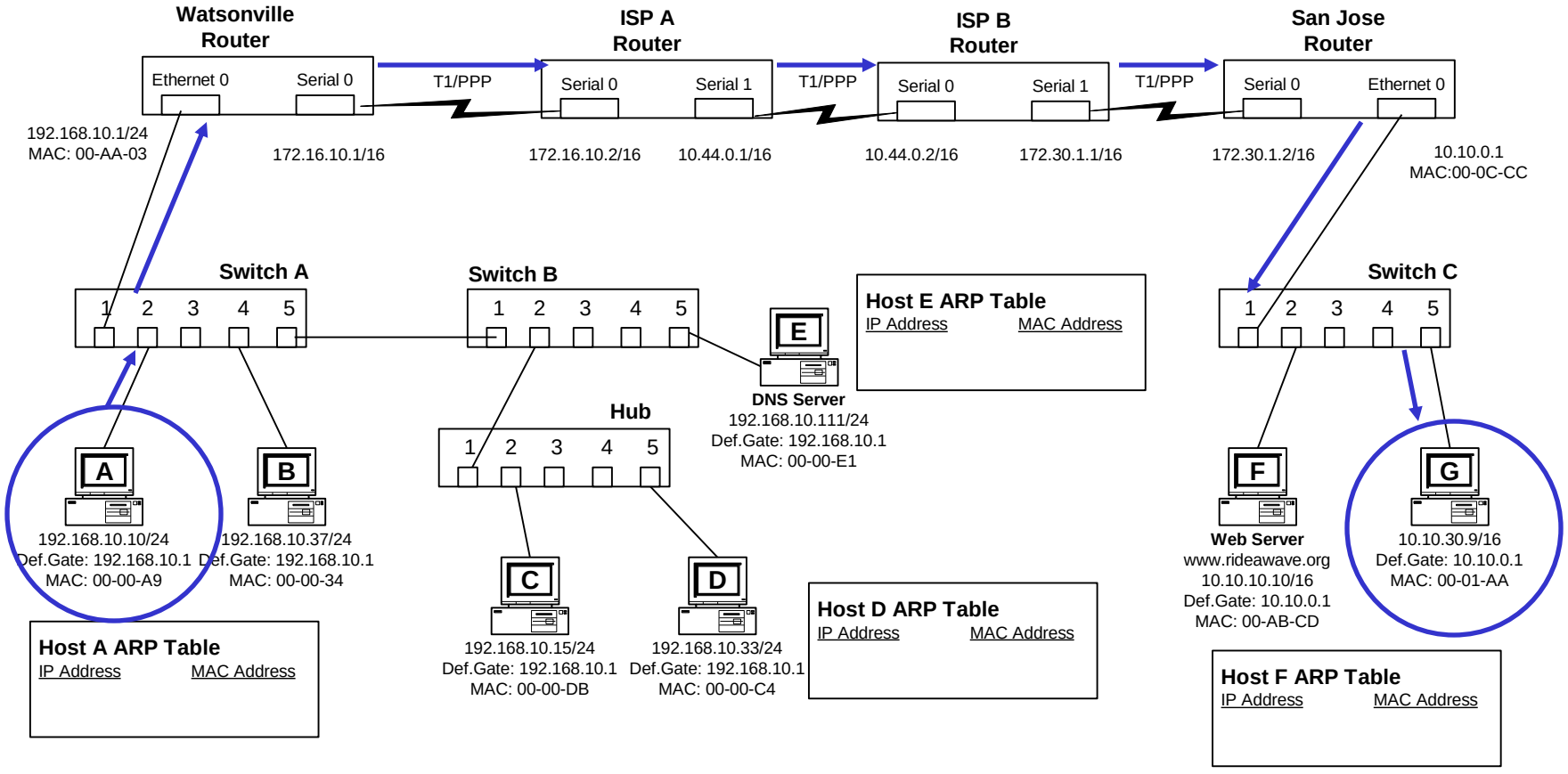
Network	Exit Int.	Next Hop
10.44.0.0	S1	Connected
172.16.0.0	S0	Connected
10.10.0.0/16	S1	10.44.0.2
192.168.10.0	S0	172.16.10.1

ISP B Routing Table

Network	Exit Int.	Next Hop
10.44.0.0	S0	Connected
172.30.0.0	S1	Connected
10.10.0.0/16	S1	172.30.1.2
192.168.10.0	S0	10.44.0.1

San Jose Routing Table

Network	Exit Int.	Next Hop
10.10.0.0/16	E0	Connected
172.30.0.0	S0	Connected
Default	S0	172.30.1.1



Host E ARP Table

IP Address	MAC Address

Host A ARP Table

IP Address	MAC Address

Host D ARP Table

IP Address	MAC Address

Host F ARP Table

IP Address	MAC Address

Switch A MAC Address Table

MAC Address	Source Port

Switch B MAC Address Table

MAC Address	Source Port

Watsonville Router ARP Table (E0)

IP Address	MAC Address

San Jose Router ARP Table (E0)

IP Address	MAC Address

Switch C MAC Address Table

MAC Address	Source Port

Watsonville Routing Table

Network	Exit Int.	Next Hop
172.16.0.0	S0	Connected
192.168.1.0	E0	Connected
Default	S0	172.16.10.2

ISP A Routing Table

Network	Exit Int.	Next Hop
10.44.0.0	S1	Connected
172.16.0.0	S0	Connected
10.10.0.0/16	S1	10.44.0.2
192.168.10.0	S0	172.16.10.1

ISP B Routing Table

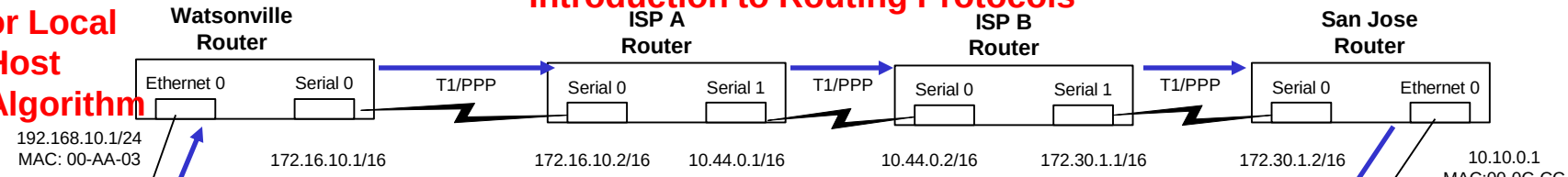
Network	Exit Int.	Next Hop
10.44.0.0	S0	Connected
172.30.0.0	S1	Connected
10.10.0.0/16	S1	172.30.1.2
192.168.10.0	S0	10.44.0.1

San Jose Routing Table

Network	Exit Int.	Next Hop
10.10.0.0/16	E0	Connected
172.30.0.0	S0	Connected
Default	S0	172.30.1.1

Introduction to Routing Protocols

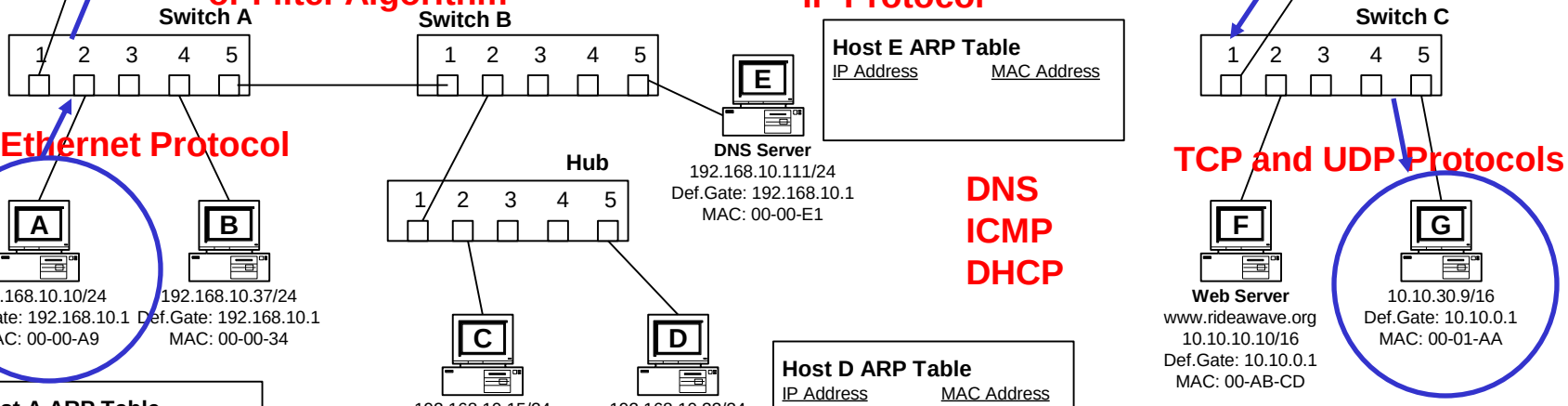
Default GW or Local Host Algorithm



Ethernet Switch Flood or Filter Algorithm

IP Addressing and Subnetting

IP Protocol



Host E ARP Table

IP Address	MAC Address

Ethernet Protocol

TCP and UDP Protocols

DNS ICMP DHCP

Host A ARP Table

IP Address	MAC Address

Host D ARP Table

IP Address	MAC Address

Host F ARP Table

IP Address	MAC Address

ARP Protocol and ARP Cache Process

Switch A MAC Address Table

MAC Address	Source Port

Learning Bridge Algorithm and Table Operations

Switch B MAC Address Table

MAC Address	Source Port

Watsonville Router ARP Table (E0)

IP Address	MAC Address

San Jose Router ARP Table (E0)

IP Address	MAC Address

Switch C MAC Address Table

MAC Address	Source Port

Course Information

Some of the fundamental networking topics covered:

- Network Topologies
- Transmission media
- Coax, twisted pair, fiber
- Modulation
- NICs
- Hubs and Repeaters,
- Switches and Bridges
- ISO and the OSI Model
- Cabling, UTP
- Collisions domains
- Broadcast domains
- Binary and Hexadecimal number systems

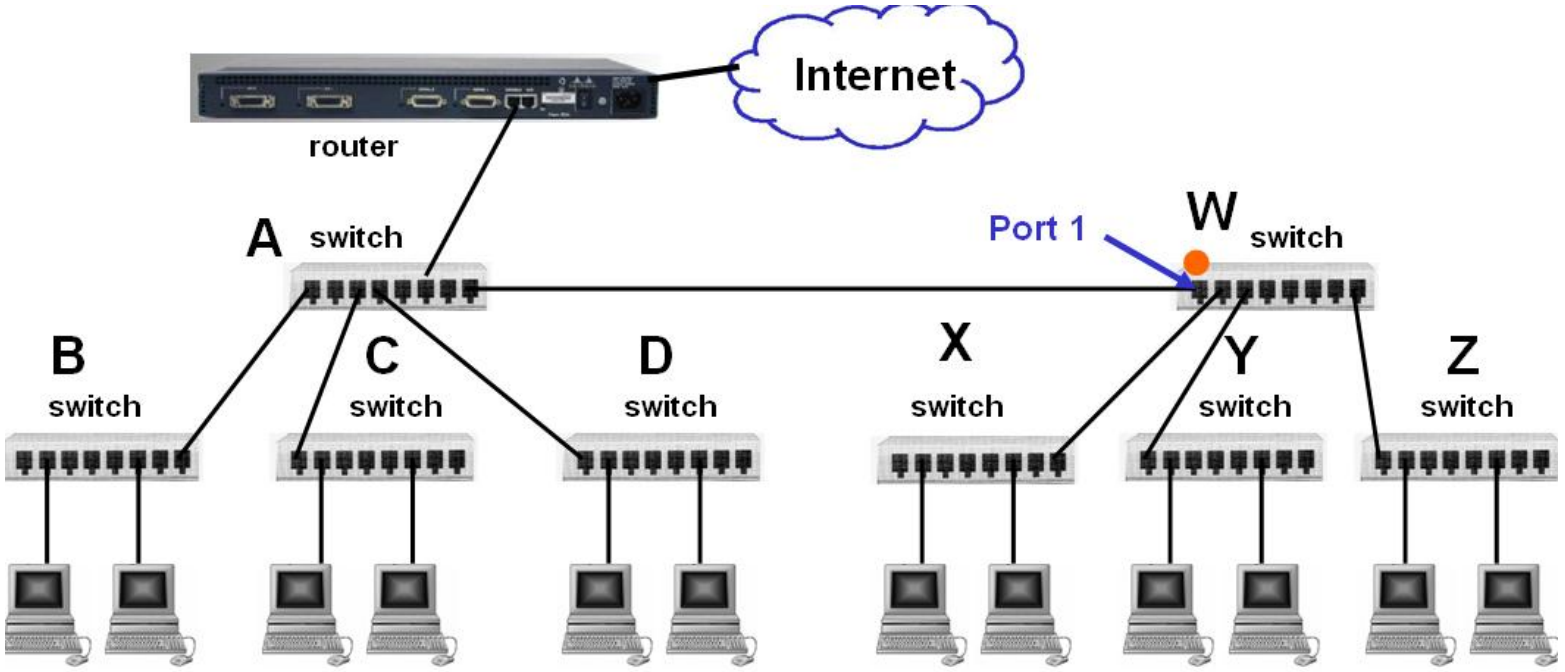
- Ethernet frames
- MAC addresses
- Layer 2 communications
- IP Addressing and Subnetting
- Classful and Classless addressing
- Introduction to Routers and Routing Protocols
- ARP
- ICMP
- DHCP and DNS
- TCP and UDP

This will **not** be the last time you learn about these topics in your networking education and career.

Understanding not Memorizing

Example: Duplex mismatches on a switch

- Memorization: Two connected switches must be configured with the same duplex setting.
- Understanding: Understand the difference between full-duplex and half-duplex, along with Ethernet operations and slot time, TCP retransmission, and troubleshooting.
  - Understand why this is happening and why the switches' duplex settings must match.



Where am I?

- “What should I already know? I don’t know any of this.”
- Perfect, you are in the right class, but you should already have basic computer literacy knowledge and skills.
  - Hardware, software, CPU, RAM, ROM, disk drives, interface cards, bits, bytes, software development,
  - WWW, email, word processing, windows, file management

- “Rick, I think I already know most, if not all of this fundamental networking information. Do I still need to take the course?”
- See me after class and we can discuss your options.

My Approach

My approach:

- Simple minded (me)
- Repetition
- Documentation (PowerPoints, Reader, Books, Internet)
- Tools:
  - Ethereal Protocol Analyzer
  - Packet Tracer
- Don’t expect you to know something I don’t cover in class.
- Do expect you to be able to extend your knowledge on your own.
- Encourage courteous participation but will not force it.
- No surprise tests.

My background

Currently

- **Computer Science/Networking Instructor, Cabrillo College**
  - All CCNA and CCNP courses, Data Communications, Programming, Systems Analysis, etc.
- **Networking Consultant**
  - Network design, implementation, and troubleshooting.
  - Work for Cisco Systems in writing networking curriculum and various other projects.
  - Work for Cisco Press and other publishers as an author and technical reviewer.
  - Disclaimer…

Other Previous Work Experience

- Technical Training Manager/Instructor: Santa Cruz Operation (SCO)
- Systems Analyst: Tandem Computers
- Programmer/Analyst: Lockheed Corporation
- Programmer/Communications Officer: U.S. Coast Guard

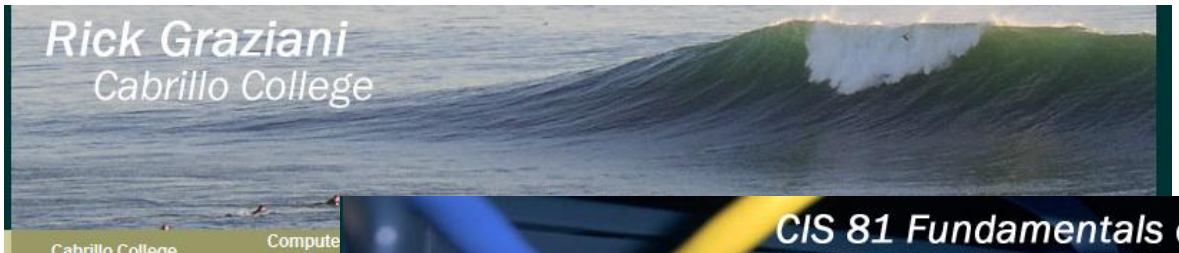
Herding Cats

- In some ways, the hardest networking course you will ever take.
- Not because it is difficult, but because:
  - A lot of new concepts
    - These concepts become more clear in later courses, after you have seen them multiple times.
  - Learning networking is like trying to herd cats. No one great place to start.
    - The material this semester will make much more sense in later semesters. The more you learn about other areas, the more a certain topic makes sense.
  - A lot of, “You will learn more about that ***later***.”
  - A lot of, “Good question, but there is no short answer right now.”
  - Sometimes, “See me after class and I can explain it.”

Subscribe!

- Cabrillo Networking Program Information
  - Subscribe to (no subject or body):
    - networkers-subscribe@cabrillo.edu
    - Program information
    - Certification information
    - Career and job information
    - Short-term classes, events, lectures, tours, etc.
    - Surveys
    - Networking info and links

Now, on to the web sites…



Cabrillo College

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Non-Cabrillo Instructors/St

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CIS 81

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a foundation in t
DHCP, ICMP), LA
protocols.

CIS 82 Routing T

CIS 82

This course discu
static and dynam
classless routing
Area OSPF, VLSM

CIS 83 Introduct

Home NetLab WebCT Online Curric

Rick Graziani
Instructor, Compu
Email: grazi

Non-Cabrillo Instructors/Students: If you would like acces

Course Materials: CIS 81 Fundamentals of

Introduction

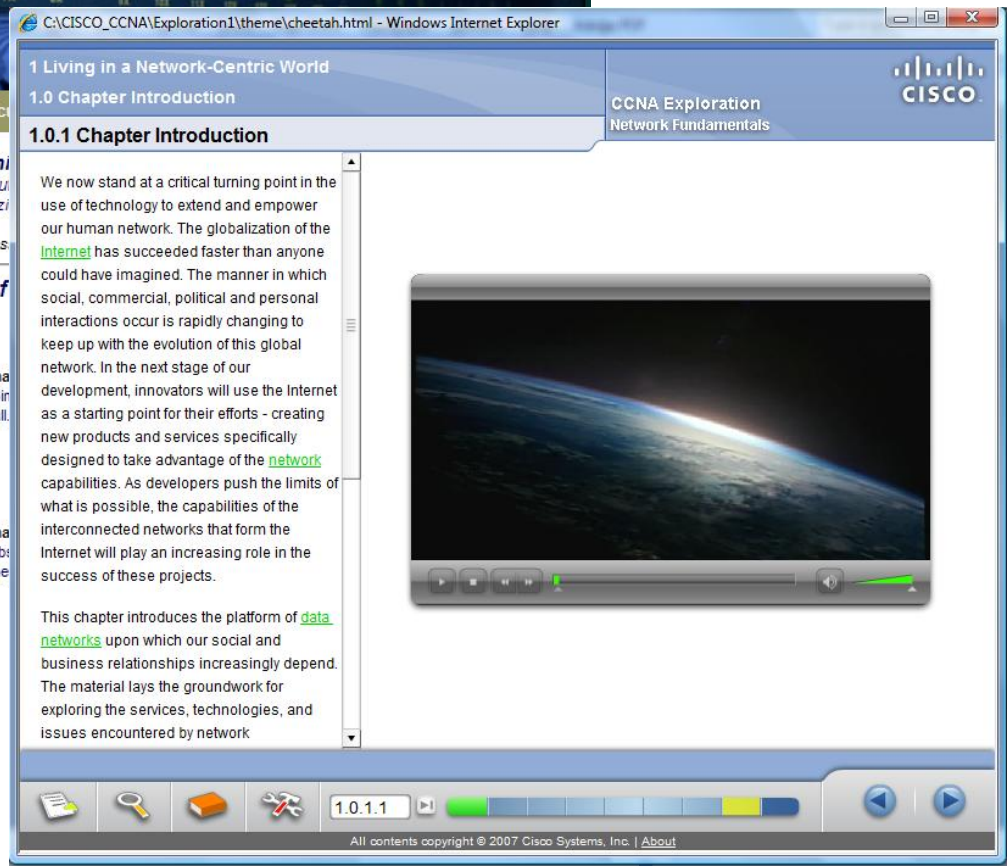
PowerPoint Presentations
Course Introduction
Course Overview
Number Systems

Instructiona
Software: Bir
Link: Firewall

Ethernet (IEEE 802.3)

PowerPoint Presentations
Ethernet Fundamentals Part 1
Ethernet Fundamentals Part 2

Instructiona
Nutshell: Hubs
Nutshell: Ethe



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